Beyond Zero Series: Industrializing Construction

Join the Building Energy Exchange and NYSERDA for a Beyond Zero Series program highlighting innovative and upscaled methods to industrialize the construction of carbon neutral-ready buildings. These replicable and scalable strategies accelerate the construction of carbon neutral-ready buildings, producing high-performing structures with low embodied carbon. Experts will discuss how their methods improve construction efficiency and quality control, while achieving great healthy, comfortable, and resilient buildings.

Opening Remarks
Matthew Brown, Program Manager, NYSERDA

Moderator
Cathy Hobbs, ASID Interior Designer/Stager, TV Host

Speakers
Tracey Wallace, Co-Founder and Chief Financial Officer, Solar Home Factory & Solar Village Company
Joey Larouche, Owner, Upbrella International
Tony Daniels, Founding Principal, Cycle Architecture + Planning

April 28, 2022 | 9 to 10:30 am | 1.5 AIA LU|HSW
Building Energy Exchange | be-exchange.org
Downtown Revitalization Initiative
Fingerlakes > Geneva  Round 1 Recipient

Lake Tunnel Solar Village
Zero Energy Modular Development
Who We Are

Developer: The Solar Village Company

Builder: The Solar Home Factory

Woman Owned

Triple Bottom Line Company

Living Wage Employer

Headquarters and Factory in Geneva, NY:
- DEC Environmental Justice Community
- NYS Econ. Disadvantaged Community
Founders installed 530 solar projects across 16 states.

Over 400 NYSERDA Incentive Contracts

$17.4M Total Sales (5 Years)

2000s

Solar Installer

2018

Single Family Modular Manufacturer

Full Volumetric Construction

Lake Tunnel Solar Village - 18 Homes

$5M Total Sales (2 Years)

2021

Multifamily Panelized Manufacturer

Retooled for Walls, Floors, Ceilings

Geneva Solar Village 87 Units

$12.5M Contract

2024

Full-Scale Multifamily Modular

200,000sqft Factory expansion

2000s 2018 2021 2024

Over 400 NYSERDA Incentive Contracts

$17.4M Total Sales (5 Years)

$5M Total Sales (2 Years)

$12.5M Contract

Wallace Cabin- Grants, NM 1995

650sqft Housing Module in Factory

Geneva Factory Expansion

650sqft Housing Module in Factory Floor Box Framing Table

Geneva Factory Expansion

Wallace Cabin- Grants, NM 1995

650sqft Housing Module in Factory

Geneva Factory Expansion

650sqft Housing Module in Factory Floor Box Framing Table

Geneva Factory Expansion
What is Modular Construction?

Volumetric Modular is the factory assembly of living spaces including finishes. Work is conducted in a controlled environment in a lean manufacturing process. All trades “above the foundation” are 95% complete in factory.

- Framing
- Plumbing
- Electrical
- Millworks
- HVAC
- Solar

What Is Net Zero?

Connected to the Grid, but 100% powered by solar on an annual basis. The buildings are energy efficient and heating/cooling is provided by heat pump systems.

- No Electrical Cost
- No Heating Cost
After
Factory Built Zero Energy Modular

- 10,000 Watt Solar Array
- SIP Walls
- Steel Siding
- Triple Pane Windows
- Fresh Air Exchanger
- Smart Home Controls
- Air Source Heat Pump
Proven Net Zero

First Development: 130% Net Positive
Tracked From NYSEG Utility Billing

Top 10
Most Efficient Home Builders in USA

Average New Home is 67 HERS
Net Zero is 0 HERS Rating
SHF Module Average -31 HERS

Solar Apartments

183' W x 53' D

A 12x 3 Bed
B 12x 1 Bed and 6x 3 Bed
C 24x 1 Bed

100% Net Zero Energy Use
Grid-Tied Solar Power

Triple-pane Windows

Energy / Water Use Monitoring

Off-Grid / Storm Mode
Lighting, Heat, Refrigeration

High Efficiency Air Conditioning
Heat Pumps

High Performance Building   Net Zero Energy Use
Downtown Revitalization Initiative

Fingerlakes > Geneva Round 1 Recipient
ONSITE HIGH-RISE ASSEMBLY

SHELTERED CONSTRUCTION FOR

ONGITE HIGH-RISE ASSEMBLY
UPBRELLA: WE START WITH THE ROOF!

The final roof! As soon as there is a floor shape to repeat.

Add a protective enclosure! To protect building, workers and neighbors.

Industrial handling! For all tasks, all workers, at all time! And to lift the roof and shelter.

Prefabrication at human scale! Reduce resources waste and maximize the 'hive' efficiency.

The roof/shelter is lifted floor by floor as the work progresses inside.

Equipment is fully reusable from one project to the other.

Using the final roof with a shelter reduces energy.

Patented in 15 countries.
Le Germain Montreal
6 floors added on existing 17 Floor building
(December 2018 to June 2019)

Demonstration of
Limited public occupancy
Installation above existing
Ultra light hybrid superstructure
Team expertise and creativity

VERTICAL ADDITION TO REDUCE DEMOLITION
HYBRID STRUCTURE WITH HUMAN SCALE PREFABRICATION

HYBRID STRUCTURES SAVE MATERIALS

2025 Peel St. Montreal
Hybrid superstructure
Concrete prefab exterior walls

Demonstration of
On-site Industrial Material handling
Upbrella system performance
System complete and reliable
Shelter Quality

VIDEO OF CONCRETE PANEL INSTALLATION: https://vimeo.com/626810511
UPBRELLA SHELTERS FOUNDATIONS – INTERNATIONAL CLT DEMO

Tower Carmelha, Monaco
CLT/Mass Timber
(2021-2022)

Demonstration of
- Exportability (COVID timing)
- Noise reduction (28dB)
- Applicable for foundations
- CLT structure compatibility

Beyond Net Zero

Assembling the Floor Structure at Man’s Height

Video: https://www.youtube.com/watch?v=T_khCL4sxEO&t=34s
FEATURES AND BENEFITS:

No scaffoldings, No tower cranes and reduced ground disturbances
Best shelter protection facilitating air and noise control
Peripheral work platforms and monorail handling to increase productivity
Mast climber(s) / construction elevator(s) for external materials and workers
Helps continued occupancy of the building during façade works

IDEAL FOR ENERGY RETROFITS

UPBRELLA FACADE RENOVATION – INTRODUCTION IN 2022

NYC LOCAL LAW 97 READY!

2X FASTER
PRODUCT APPLICATIONS WITH REUSABLE EQUIPMENTS

2016
New builds

2019
Vertical additions

2022
Facade retrofits

2024
Deconstruction and Reusability

SPEED
QUALITY
SAFETY
GREEN

UPBRELLA FOR ALL STEPS OF THE BUILDING LIFE CYCLE: https://www.youtube.com/watch?v=BEDObB1eBx4
Understanding Deep Energy Retrofits

Can we get there from here?

Tony Daniels, RA, principal
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Beyond Zero Series:
Industrializing Construction

Thursday
Apr 28th, 2022
Hey Architect!
Retrofit THIS
In Search of a Solution
What Characterizes a Solution?

Predictability

*Decision Makers need to know what they are in for, and what they will get*

- Capital Cost
- Schedule
- Permitting
- Energy Savings/NOI
- Maintenance Obligations

https://www.freepik.com/photos/woman Woman photo created by cookie_studio - www.freepik.com
What Characterizes a Solution?

Repetition

Until we are masters of 3d printing every component, we have to rely on current industrial assembly processes (e.g. robotics, assembly line, etc.)

- Offsite Assembly
- Economies of Scale
- Integrated with Logistics
- Quality Control Procedures
- Maintenance Obligations

What Characterizes a Solution?

**Standardization**

Leverage modularity, common components, automate design and calculation

- Building Codes, Inspections and Testing
- Rote Engineering
- Insurance
- Open Market
- Innovation/Improvement

What Characterizes a Solution?

Specialization

*The right piece in the right place.*

- Each component is part of the whole
- Each component may have its own source.
- Applicable especially for retrofits
Elements of a Typical Deep Energy Retrofit

- Existing Buildings are energy inefficient, and often poorly maintained.
- Retrofits seek to radically reduce energy consumption at a building and can meet Passive House standards.
- Retrofits are big projects - not just weather-proofing and repairs.
In-Unit Changes

Current Building

BATHROOM
- Inefficient exhaust system, high consuming lights.

OLD WINDOWS
- Water and air leaks, difficult window operation, damaged frames and water penetration.

KITCHEN
- No ventilation system. Inefficient appliances increase gas and electricity bill. Inefficient faucets increase water consumption.

WINDOW A/C
- No cooling system. Personal A/C causes an increase in rent cost per A/C unit.

RADIATOR/HEATING
- High heat in winter months results in open windows and discomfort.

FAÇADE
- Substantial heat loss through the walls.

RetrofitNY Renovations

BATHROOM
- New ventilation system, efficient lights reduce energy consumption.

NEW VENTILATION SYSTEM
- Improves indoor air quality in every room.

NEW ENERGY EFFICIENT WINDOWS
- Lower energy bills. Keep temperature consistently comfortable. Reduce UV sun damage to floors, carpets, and furniture. Reduce noise.

KITCHEN
- New ventilation system integrated to window to reduce food odors. New faucet reduces water consumption. Efficient lights reduce energy consumption.

WASHER / DRYER
- In-unit stackable washer/dryer.

INDIVIDUAL HEAT PUMPS
- Unit controlled heating and cooling for every room.

NEW FAÇADE
- Provides thermal jacket to existing/patent building. New facade design.
Panelized Overcladding System

- Increased insulation values
- Factory Assembled
- Lifted into place and installed onto the facade of the building
Heating and Cooling Systems

Available Technology and Unitized Systems
Heating and Cooling Systems

Unitized Packaged Heat Pump - All Electric
Domestic Hot Water Heating

Air Source Heat Pump

- CO2 refrigerant - least GWP
- 1 for 1 replacement of existing fossil fuel fired hot water boiler.
- Connects to existing water distribution system
Equitable

- Reduce Site Disruption
- Avoid work within people’s homes
- People remain in their homes
- Qualitative Improvements
- Work with the building you have
Thank You

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discuss.

send questions via Zoom Q+A

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thank you.